pervious topsheet, a liquid impervious backsheet and an absorbent structure enclosed therebetween; said absorbent structure comprising a combination of a porous material selected from the group consisting of fibers, foam and mixtures thereof, and a superabsorbent material, wherein the absorbent structure contains at least 50% by weight of superabsorbent material, based on the total weight of the structure in dry condition in at least one area thereof in which the superabsorbent material is distributed; said superabsorbent material being crosslinked by ionic bonds and being in the form of a powder, grains or granules.--

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REMARKS

The application has been amended as needed so as to place it in condition for disposal at the time of the next Official Action.

In the course of this revision, an Abstract of the Disclosure, which is believed to comply with 37 CFR §1.72(b) and Section 608.01(b) of the Manual of Patent Examining Procedure (MPEP), has been provided.

Claims 1-12 were rejected under 35 USC §112, second paragraph, for indefiniteness. The Primary Examiner's well-taken formal criticisms of these claims were borne in mind as points to be corrected when drafting the new claims. Specifically, new claims 13-24 were drafted in such a manner as to particularly point out and distinctly claim the subject matter regarded by applicant as her invention. When drafting the new claims, great

care was taken to ensure that the terms recited therein possessed proper antecedent basis. Moreover, the use of vague, objectionable, or otherwise indefinite expressions was avoided. Thus, new claims 13-24 are believed to set out and circumscribe a particular absorbent structure with a reasonable degree of precision and particularity, when read in light of the teachings of the original specification. It is respectfully submitted that a person having ordinary skill in the art would be reasonably apprised of the metes and bounds of new claims 13-24. Accordingly, it is believed that the rejection of the claims under 35 USC §112, second paragraph, has been overcome and should not be applied to new claims 13-24.

Claims 1-5 and 9-12 were rejected under 35 USC §102(b) as being anticipated by RICHARDS et al. 5,607,414. The Official Action states that this patented reference discloses the use of an absorbent article with a topsheet, backsheet and absorbent structure located therebetween. The absorbent structure is stated to comprise a fluid storage layer that is a composite of cellulose fibers and superabsorbent discrete particles. It is advanced that the RICHARDS et al. reference discloses that the superabsorbent is made from polyacrylates or polyacrylate grafted starch that is crosslinked with anionic groups (forming an ionic bond) such as polycarboxylic acid (column 15, lines 5-45). It is concluded that it is inherent that if the crosslinking agent is anionic that it will form an ionic bond with the cationic group

of the polymer. Reconsideration of the above rejection is respectfully requested for the following reasons.

Applicant's technical experts have carefully studied the RICHARDS et al. reference and the crosslinking agents disclosed therein, and are of the firm opinion that this patented reference discloses only covalent crosslinking agents. Indeed, none of the crosslinking agents disclosed in column 15, lines 5-45 are believed to be ionic crosslinking agents. In addition, it is noted that the patented reference does not mention polycarboxylic acids as crosslinking agents, but "di- or polyesters of unsaturated mono- or polycarboxylic acids with polyols" (see lines 42-45).

The mere fact that the patented reference mentions a "partially neutralized" polymeric gelling material, which is indicative of the presence of electrically charged groups, in no way suggests that the material is crosslinked by ionic bonds, as is required by applicant's invention.

As is explained in the specification, the object of the present invention is to solve the problem of gel blocking in absorbent structures containing high amounts of superabsorbent material (more than 50%). A major problem in the use of superabsorbent materials in absorbent structures is that they cause gel blocking. The gel blocking phenomenon means that the superabsorbent material when wetted forms a gel which blocks the pores in the fiber structure and consequently deteriorates the

liquid transport away from the wetting area to the other parts of the absorbent structure. This gel blocking causes significant problems especially at repeated wettings, since by then the already swollen superabsorbent blocks the new liquid from being received and spread in the absorbent structure. This problem is accentuated when the absorbent structure contains high concentrations of superabsorbent material. In order to provide an absorbent article that is comfortable and discrete to wear, it is desirable that the article be thin. In order to maintain a high liquid absorption capacity, such thin products often have a high amount of superabsorbent material.

Applicant has discovered that ionically crosslinked superabsorbents used in high amounts (at least 50 wt%) in absorbent structures lead to improved properties of the structure with respect to liquid acquisition capacity, and distribution capacity at repeated wettings, as compared to a superabsorbent which is only covalently crosslinked. This discovery is substantiated by the comparative tests presented in the original specification, and depicted in the drawings.

The reason for these improved results is believed to be that a superabsorbent, which is surface crosslinked or homogeneously crosslinked with an ion-binding crosslinking agent maintains its gel stability after swelling in a better fashion, since the ionic bonds can be redistributed and regenerated as the polymers swell, which a covalent crosslinking bond simply cannot

do. When a superabsorbent that is covalently crosslinked absorbs liquid, the covalent crosslinking bonds are gradually broken, and consequently the superabsorbent gradually loses its gel stability as it swells, which leads to gel blocking, as is explained in the third full paragraph on page 6 of the specification.

In the comparative tests described in the specification, the superabsorbent was used in particle form, such as powders, grains or granules. Consequently, commensurate with these test conditions, the superabsorbent material recited in independent claim 13 is limited to this physical characteristic.

It should be pointed out that the superabsorbent material according to the present invention can be either only ionically crosslinked, or both covalently and ionically crosslinked. The ionic crosslinking can either be on the surface of the superabsorbent particles, or homogeneously through the entire structure of the superabsorbent.

It follows that newly-presented claims 13-24 are neither disclosed, nor suggested by RICHARDS et al., particularly in light of the unexpected results achieved by the absorbent structure recited in applicant's claims.

Claims 6-9 were rejected under 35 USC §103(a) as being unpatentable over RICHARDS et al. in view of JOHNSON et al. 5,684,106. The secondary reference to JOHNSON et al. is relied upon as disclosing superabsorbent polymers being surface crosslinked. It is concluded that it would have been obvious to

one of ordinary skill in the art to have the superabsorbent particles of RICHARDS et al. being surface crosslinked as taught by JOHNSON et al., in order to obtain improved absorption under load characteristics while maintaining conventional commercial centrifuge retention capacities.

Reconsideration of the above rejection is respectfully requested for the following reasons.

While the secondary reference to JOHNSON et al. may disclose the feature for which it was relied upon, mainly surface crosslinking of superabsorbent articles, it nevertheless fails to remedy the fundamental shortcomings of the basic primary reference to RICHARDS et al., so as to render the herein claimed subject matter obvious within the meaning of 35 USC §103. Indeed, the secondary reference to JOHNSON et al. simply fails to disclose or suggest an absorbent structure having the characteristic features recited in applicant's newly-presented independent claim 13, whose superabsorbent material is crosslinked by ionic bonds, and is in the form of a powder, grains or granules.

It is respectfully submitted that when considering the applied references collectively, there would be no reason, motivation or suggestion to combine their respective teachings in the manner necessary to achieve the herein claimed invention. Indeed, the combined teachings of RICHARDS et al. and JOHNSON et al. would not have resulted in an absorbent structure having the

characteristic features recited in newly-presented independent claim 13, wherein the superabsorbent material is crosslinked by ionic bonds and is in the form of a powder, grains or granules.

In view of the present amendment and the foregoing remarks, therefore, it is believed that this application has been placed in condition for allowance. Reconsideration and allowance on the basis of new claims 13-24 are accordingly solicited.

In the event that there are any questions relating to this amendment or to the application in general, it would be appreciated if the Examiner would telephone the undersigned attorney concerning such questions so that the prosecution of this application may be expedited.

Attached hereto is a marked-up version of the changes made to the specification. The attached page is captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE."

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

Page 4, the paragraph beginning on line 15 has been amended as follows:

--The superabsorbent material is preferably crosslinked by cations, which by means of ionic bonds are bonded to the anionic functional groups of the superabsorbent material. According to one embodiment, the cationic crosslinking agent comprises a polyvalent metal ion, for example aluminum, zirconium, chrome, titanium or zinc. According to a preferred embodiment, the ionic crosslinking is made by aluminate ions, $[Al(OH)^{4-}]$ $[Al(OH)_4]^-$.--.

Page 6, the paragraph beginning on line 12 has been amended as follows:

--Preferably, the crosslinking agent is an aluminate ion, $[Al(OH)^{4-}]$ $[Al(OH)_4]^-$ in accordance with what is disclosed in the German patent application no. 198-18852.8 filed the same day. When producing such a superabsorbent, aluminate ions are added to a water-containing gel of a carboxy group containing polymer, [e g] e.g., a polyacrylate, which preferably is crosslinked by means of covalent bonds in a conventional way. The gel is crosslinked with the aluminate ions before drying to a powder or granules, at which a homogeneously ionically crosslinked hydrogel structure is obtained.--;

Page 6, the paragraph beginning on line 20 has been amended as follows:

--When a superabsorbent absorbs liquid and swells, the covalent bonds to the crosslinking agent are successively broken up, which leads to that the superabsorbent [looses] loses its gel stability in connection with the swelling. A superabsorbent, however, which is surface crosslinked or homogeneously crosslinked by [a] an ionic crosslinking agent, maintains its gel stability [afte] after swelling in a better way, due to that the ionic bonds can be rearranged and recreated as the polymer swells, which a covalent bond is not able to do.--.

Page 8, the paragraph beginning on line 1 has been amended as follows:

--The superabsorbents that were used were a [commersially] commercially available superabsorbent from Clariant GmbH named Sanwet IM 7100 and three different test substances of a polyacrylate homogeneously crosslinked by aluminate ions according to above and which besides was covalently crosslinked. The test substances were named E271/97, E214/97 and E222/97 and were supplied by Clariant GmbH and Clariant Corp.--.

Page 9, the paragraph beginning on line 8 has been amended as follows:

--Pouches of polyester net 7x12 cm were prepared. 0.2 g of superabsorbent were [weightd] weighed and placed in the

pouches, which were welded and weighed. The pouches were immersed in synthetic urine during 60 minutes after which they were taken up, were allowed to drain and were weighed. The difference in weight after and before absorption gives the free swell capacity.--.